RESEARCH
Original Research

Reported Action to Decrease Sodium Intake Is Associated with Dining Out Frequency and Use of Menu Nutrition Information among US Adults

Karen Byrd, PhD, RD, LD; Barbara Almanza, PhD, RD; Richard F. Ghiselli, PhD; Carl Behnke, PhD; Heather A. Eicher-Miller, PhD

ARTICLE INFORMATION

Article history:
Submitted 21 October 2016
Accepted 14 June 2017
Available online 3 August 2017

Keywords:
Sodium
Restaurants
Eating out
Menu labeling
Menu nutrition information

http://dx.doi.org/10.1016/j.jand.2017.06.012

ABSTRACT

Background Restaurant foods have been shown to be high in sodium and limited sodium content information provided through menu nutrition information (MNI) is available at the point of purchase. Dining out and use of MNI are behaviors that can be altered by consumers who are trying to decrease their sodium intake.

Objective The aim of this study was to determine the relationship between reported consumer actions to decrease sodium intake and dining out frequency and awareness and use/or intended use of MNI.

Design/participants A secondary analysis was conducted using responses from 5,588 US adults aged 20 years or older who participated in the 2013-2014 cross-sectional National Health and Nutrition Examination Survey household interview.

Main outcome measures The main outcomes were dining out frequency and seeing MNI, using MNI if seen, or would use MNI if provided.

Statistical analyses performed Linear and logistic regression models were used to assess the relationship of consumers reporting and not reporting action to decrease sodium intake and the outcome measures.

Results Reported consumer action to decrease sodium intake compared to no action was associated with an overall decreased dining out frequency of approximately one meal per week (mean±standard error=3.12±0.10 compared to 4.11±0.14; $P<0.01$). When separated by type of restaurant, the relationship was significant for fast-food or pizza establishments (mean±standard error=1.35±0.05 meals compared to 2.00±0.07 meals; $P<0.001$), but not other types of foodservice operations. The odds of seeing MNI, using MNI when seen, or would use MNI if provided were higher for consumers reporting actions to decrease their sodium intake compared to those who were not for both fast-food or pizza establishments and restaurants with wait staff (odds ratio ranged from 1.17 [95% CI 1.04 to 1.32] to 2.24 [95% CI 1.82 to 2.76]; P values ranged from <0.05 to <0.001).

Conclusions Compared to consumers reporting no actions to decrease sodium intake, consumers reporting actions indicate they dine out less frequently, specifically at fast-food or pizza restaurants and report they are more likely to use MNI. These results may inform the restaurant industry of the actions of a potentially growing consumer group and provide insights for future public health initiatives targeting population sodium reduction.
J Acad Nutr Diet. 2018;118(5):824-835.

RECOMMENDATIONS TO DECREASE DIETARY SODIUM intake have been included in the Dietary Guidelines for Americans since 1980, as well as in every iteration since.[1-8] Despite these long-standing recommendations, data based on urinary sodium excretion, a biomarker for dietary sodium intake, shows a slight but significant increase in sodium consumption among US adults from 1988 to 2010.[9] As of 2013-2014, sodium intake (not including salt added at the table) greatly exceeded the recommended upper limit of 2,300 mg/day,[10-12] with consumption approximating 3,915 mg/day (1,681 mg/1,000 calories) for males and 2,920 mg/day (1,685 mg/1000 calories) for females.[13]

Some researchers have called into question the need to decrease daily dietary sodium intake to ≤2,300 mg for the general population,[14,15] but others have shown evidence in support of these recommendations, primarily to decrease the prevalence of hypertension.[16-20] Approximately 29.0% of US adults have hypertension,[21] which translates to nearly 72 million people based on data from 2014.[22] This percentage is expected to increase to approximately 41.4% by 2030[23] due to the increased likelihood of elevated blood pressure with advancing age[21] and an increasing prevalence of the population who are 65 years and older.[22]

The vast majority of US adults are aware of the link between high sodium intake and hypertension.[24,25] Yet, despite

close to 90% of US adults consuming sodium in excess of the upper recommended limit,[26] only 40% to 50% report taking action to decrease their intake.[24,27] The percent who report taking action to decrease sodium intake is higher for certain groups, such as those that have hypertension, are taking medication for hypertension, or have received advice from a medical professional to decrease their salt or sodium intake.[24,27] However, peer-reviewed research that includes evaluation of the specific strategies used by consumers to decrease sodium intake is limited.[24] Furthermore, there is a lack of data describing reported actions to decrease sodium consumption specifically from restaurant foods, which have been shown to be a significant contributor of sodium in the US diet.[28]

The nutritional quality of restaurant foods are of particular concern because of increasing food consumption away from home.[29,30] Data from *What We Eat in America*, National Health and Nutrition Examination Survey (NHANES) 2013-2014, shows that 30% of total sodium intake among all US adults is from restaurant foods.[31] This estimate is even higher, at 51%, for the subset of individuals who report eating at least one food/beverage from a restaurant in their 24-hour dietary recall.[31] Sodium content estimates for a single restaurant meal often exceed daily intake recommendations.[32] Furthermore, sodium density (milligrams of sodium per 1,000 calories) is typically greater in restaurant foods compared to home-prepared foods.[33] When comparing foods by restaurant type, sodium density was greater in foods from sit-down restaurants (except fine dining) compared to fast-food establishments.[33,34] Despite high levels of sodium in restaurant foods, very few researchers have examined how consumers' reported efforts to decrease sodium intake are related to their reported frequency of dining out.

Consumer access to information about the sodium content of restaurant foods at the point-of-purchase is limited, as this information is currently only required nationally on packaged foods. This lack of information may inhibit consumers' ability to choose restaurant foods that are lower in sodium. Provisions of the Patient Protection and Affordable Care Act 2010 require calories to be printed on restaurant menus as of May 2018 for chain restaurants with $\geq$20 locations, but sodium information is only required to be available upon request.[35,36] While some research shows that the addition of calories to the menu may result in decreases in sodium intake,[37] the question of whether consumers who report decreasing their sodium consumption are more likely to be aware of and use menu nutrition information (MNI) than consumers who state they are not decreasing their sodium intake has not been evaluated.

Knowledge of the dining out behaviors of adults reporting action to decrease their sodium intake can provide foodservice operators and restaurateurs with information of how this consumer goal may affect their business, contribute to the development of strategies to decrease sodium intake at restaurants and other commercial foodservice operations, and inform public health education for the high percentage of Americans with excessive sodium intake. Therefore, this study focused on two objectives related to consumer-level sodium-reduction strategies and food away from home: 1) determining whether a relationship exists between consumer reports of action to decrease sodium intake and dining out frequency; and 2) determining whether a relationship exists between consumer reports of action to decrease sodium intake and their awareness and use or intended use of MNI at fast-food or pizza restaurants and restaurants with wait staff. Relationships were evaluated among a nationally representative sample of US adults aged 20 years and older.

METHODS

Survey Design and Participants

Participant data for this study were obtained from the publicly available 2013-2014 NHANES, a program of the Centers for Disease Control and Prevention. NHANES is a cross-sectional, multistage, cluster-probability survey using a sampling frame of all 50 US states and the District of Columbia on a 2-year cycle basis.[38] To improve the accuracy of estimates of certain subgroups, the 2013-2014 survey included oversampling of Hispanic, non-Hispanic black, and Asian individuals; certain individuals at or below 130% of the federal poverty level; and individuals 80 years of age and older.[39] A detailed description of the data collection procedure and sample design specifications are described elsewhere.[39]

Although NHANES includes a household interview and a physical examination, only questions from the household interview were used to meet the study objectives. Relevant questions included dining out frequency, diet-related behaviors, health information, and demographics. In addition, only the subset of adults aged 20 years and older was included in the analytical sample (n=5,588) because they are more likely to be the primary dining out decision makers. The resulting sample was adjusted to be representative of the civilian, non-institutionalized resident US population of adults. NHANES protocol and measures were approved by the National Center for Health Statistics Research Ethics Review Board.[40] This study was a secondary analysis of NHANES de-identified public data and was exempt from Institutional Review Board review.

Measures and Variables

Objective 1. The primary independent variable for objective 1 was reported action to decrease sodium intake (binary). This variable was based on the question, "to lower your risk for certain diseases, are you now reducing the amount of sodium or salt in your diet?" with answer choices of "yes" or "no." Outcome measures included three continuous variables. Two of these variables—dining out frequency at all locations and dining out frequency at fast-food or pizza places—were based on the question sequencing in Figure 1. A response of "0" (eg, consumed food away from home 0 times in the past 7 days) for dining out frequency at all locations was also coded as "0" for dining out frequency at fast-food or pizza locations because these participants did not get meals from fast-food or pizza locations (Figure 1). The third outcome measure, dining out frequency at other foodservice locations, was calculated by subtracting the frequency of dining out at fast-food or pizza places from the total frequency for dining out. Dining out frequency (eg, meals away from home) was defined as breakfast, lunch, and dinner meals. Participants were instructed not to include meals provided as part of a community program.